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2017 aerial scoter and scaup survey, Alaska:

Yukon Flats National Wildlife Refuge annual monitoring report

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Photo by Steve Berendzen

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Aerial scoter and scaup monitoring survey of the Yukon Flats National Wildlife Refuge (NWR), 2017

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Abstract:

The sixteenth annual aerial survey to monitor scoter and scaup populations on the Yukon Flats National Wildlife Refuge was conducted 5, 6, 7 and 13 June, 2017. The survey area (9,728 km^2) consisted of four strata, including 58 total transects (678 km^2 sampled area). White-winged scoters accounted for 99%, and surf scoters accounted for the other scoter species observed in 2017. The number of white-winged scoters estimated in the study area in 2017 (9,303) during the breeding season was lower than the previous fifteen-year mean (2001-2005 and 2007-2016) of 14,690. No black scoters were observed in 2017. The scaup monitoring index for 2017 was 24,112, which was similar to the average index value for 2002 – 2016 (26,611). Pacific loons and trumpeter swans were counted opportunistically. In 2017, a monitoring index for Pacific loons was estimated at 1,071, which was lower than the 10 year average from 2007 – 2016 (1,652). The trumpeter swan population index was 1,029 in 2017, which was similar to the previous 10 year average from 2007 – 2016 (876).

Key Words: aerial survey, Yukon Flats, white-winged scoter, surf scoter, lesser scaup, monitoring

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INTRODUCTION

Waterfowl were a primary purpose for the establishment of Yukon Flats National Wildlife Refuge due to high densities of breeding birds. In particular, Yukon Flats has the largest breeding population of white-winged scoters (*Melanitta deglandi*) and lesser scaup (*Aythya affinis*) in Alaska (Bellrose 1980, King and Lensink 1971, Lensink 1965, Palmer 1976). White-winged scoters were identified as a high priority conservation species by Sea Duck Joint Venture (Sea Duck Joint Venture Management Board 2008, Sea Duck Joint Venture 2013); Migratory Bird Management (MBM) developed a white-winged scoter Action Plan in 2011 to address critical information needs (USFWS 2011); and USFWS, Alaska Region, identified white-winged scoters and lesser scaup as priority species in 2013. In 2016 conservation framework plans were developed for lesser scaup and white-winged scoter. White-winged scoters and scaup are of conservation interest because:

1) They have exhibited substantial population declines throughout their North American breeding grounds, with the steepest decline in the Canadian western boreal forest and a more gradual decline in the Yukon Flats, Alaska (Afton and Anderson 2001, Alberta Sustainable Resource Development 2002, Austin et al 2000),
2) They breed primarily in boreal forests of Canada and Alaska (Bellrose 1980), where ecological shifts from projected climate change are expected to be the greatest,
3) Little is known about white-winged scoter populations, with basic information lacking about their natural history, vital rates, population status and trends,
4) White-winged scoters' breeding range has retracted north since 1900 (Alberta Sustainable Resource Development 2012),
5) Breeding population estimates for combined scaup species (lesser and greater scaup) have been below the North American Waterfowl Management Plan population goal of 6.3 million since the late 1970's (U.S. Fish and Wildlife Service 2013), and
6) Both species are hunted throughout their range, including spring subsistence waterfowl hunts on Yukon Flats, where white-winged scoters are the preferred species.

Existing large scale waterfowl monitoring surveys such as the Alaska-Yukon Waterfowl Breeding Population Survey (Mallek and Groves 2011) are not temporally designed to monitor scoters and scaup, which are among the latest migrants to arrive on their breeding grounds (Lensink 1965). Surveys are timed for peak detectability of dabbling ducks, whose breeding chronology is approximately 3 weeks earlier than for scoters and scaup (Mallek 2003). Scoter and scaup estimates during these surveys are expected to be highly variable due to birds migrating through, or having not yet arrived, at the surveyed breeding area (Kehoe 2002, Afton and Anderson 2001).

The Yukon Flats survey was initiated in 2001 (Mallek 2003, Mallek 2006) to identify peak detectability and provide monitoring data primarily for white-winged scoters (*Melanitta fusca*) that breed on the Yukon Flats. Due to the late nesting timing of scaup, they were added to this monitoring survey in 2002. The Yukon Flats survey is the most spatially extensive survey of scoters and scaup throughout their breeding range.

STUDY AREA AND METHODS

Study Area and Survey Design

The Yukon Flats study area (9,728.3 km^2) included 58 transects systematically located in four strata within the Yukon Flats where previous surveys (Platte and Butler 1992) indicated relatively high scoter densities (Figure 1).

Transects were 400 meters wide resulting in 678.4 km^2 of sample area. The survey was flown at 100-150 feet above ground level and 90-105 mph. Aircraft navigation and altitude were maintained with a Global Positioning System (GPS) and altimeter, respectively. Scoters and scaup were recorded during the survey, and a circling maneuver was used to positively identify scoters to species when necessary. Additionally, loons and swans were recorded.

The survey was temporally designed to occur when the highest numbers of indicated breeding white-winged scoters were present in the survey area. Previous replicate scoter surveys of the Yukon Flats (Mallek 2003) indicated that the end of the first week through the second week of June was the most appropriate time to monitor white-winged scoters. Additionally, this time period is supported by nesting data of white-winged scoters on the Yukon Flats where the median dates of nest initiation were 20 and 19 June in 2003 and 2004, respectively (D. Safine, unpubl. data). Therefore, the survey occurs when most females are on the water, prior to nesting.

Survey Procedures

Observations were recorded directly into laptop computers as sound files using a computer program developed by John Hodges (USFWS, Region 7, Waterfowl Management-Juneau). Each laptop computer (one for each observer) was linked to a GPS unit. The computer program simultaneously recorded observations and their geographic coordinates into linked sound and ASCII files, respectively. A second computer program, also developed by John Hodges, was used on the ground to replay the linked sound files and produce transcribed ASCII files. The transcribed ASCII files were then used for data analyses.

A Cessna 185 float equipped aircraft was used to conduct the survey. Observations of scoters and scaup were recorded according to breeding pair survey protocol (USFWS and CWS 1987). All observations of lone male scoters and scaup (drakes) were recorded as singles. Drakes in flocks were recorded as flocked drakes. A male scoter or scaup in close association with a female of the same species was recorded as a pair. Scoters and scaup in mixed-sex groupings of three or more of the same species which could not be separated into singles and pairs were recorded as groups (a hen and two drakes were recorded as a pair and a single). Females not accompanied by drakes were not counted.

Statistical Methods

Following standard waterfowl breeding population survey data protocol (Smith 1985, USFWS and CWS 1987), all observations of lone scoter drakes, flocked scoter drakes (<5), and scoter and scaup pairs were doubled for analyses. Observations of lone scaup drakes, and flocked scaup drakes were not doubled for analyses. Groups of scoters and scaup were not doubled for analyses.

Population indices and variance estimates were calculated using standard statistical procedures for stratified analyses as described by Smith (1995). Densities of white-winged scoters and scaup were estimated per strata per square kilometer. Visibility correction factors were not incorporated in the population indices.

RESULTS AND DISCUSSION

The sixteenth annual scoter monitoring survey (fifteenth annual survey that included scaup) was conducted on Yukon Flats on 5, 6, 7 and 13 June, 2017 by pilot/observer Nikki Guldager and observer Mark Bertram. The survey start date was on schedule with previous start dates, and spring timing was similar to previous years. The Yukon River broke-up at Fort Yukon on 11 May, 2017. The median break-up date is 10 May, and the earliest and latest break-up dates are 1 and 24 May, respectively, since 1984 (http://aprfc.arh.noaa.gov/php/brkup). The mean temperature (10°C) in Fort Yukon in May 2017 was similar to the 10-year mean (2007 – 2016 = 10°C; range = 6°C – 13°C), and the minimum temperature in May (-1 °C) was on the high end of the temperature range in 2017 relative to the previous 10-years (mean May minimum temperature = -5° C; range = -14 – -1°C). There were 4 days that were <= 0 °C in May 2017, which was below the 2007 – 2016 average of 10 (range = 1 – 20 days) (https://wcc.sc.egov.usda.gov/reportGenerator). Overall, spring timing seemed average, and temperatures were slightly warmer than average.

Strata information, species counts, densities, and index values are presented in Table 1. Figure 2 depicts annual trends for white-winged scoters and scaup in Yukon Flats.

Yukon Flats

Scoters

White-winged scoters accounted for 99% of indicated-total scoters observed in 2017, and the monitoring index for the study area was 9,303 (Table 1). The white-winged scoter point estimate was the lowest observed, however, estimates were not significantly different from the previous 15-year mean (2001-2005 and 2007-2016, 15,049, Figure 2).

Overall white-winged scoter estimates for the entire study area have been relatively stable among years, however relative use of strata among years is inconsistent. High density areas shift among strata and among years. The south stratum had variable but consistently high estimates among years, while the east stratum was the most variable among years. Changes in the distribution of birds among strata between years indicate the importance of including all strata in population monitoring efforts. Such differential use among years may indicate selection for annually variable habitat characteristics such as water level, annual changes in breeding phenology, food availability, and/or numbers may be inflated and inconsistent due to transient birds moving through the study area on their way to breeding grounds located elsewhere.

Surf scoters accounted for 1% of the indicated-total scoters observed in 2017, and the index was 82 (Table 1). Few surf scoters were observed on all surveys therefore among-year variation was high. The 2001-2016 range in estimates for surf scoters was 28 – 1,034.

No black scoters (*Melanitta nigra*) were observed on the 2017 survey. Previous surveys indicated that very few black scoters use this area and it is doubtful that any breed on the Yukon Flats.

Scaup

The scaup monitoring indexes for 2017 was 24,112, which was similar to the average index value for 2002 – 2016 (26,611) (Table 1, Figure 2).

The relative use among strata is somewhat consistent among years, with west stratum estimates being consistently higher than estimates for all other strata for all survey years (Figure 3).

Loons

The Pacific loon index for 2017 was 1,071 (Table 1), which is lower than previous estimates from 2007 – 2016 (range = 1,091 – 2,125). Pacific loons have consistently had the highest population indexes in the south and west strata (Figure 3), however, estimates were higher in the north than the south strata in 2016 and 2017. The east strata have had consistently low densities of Pacific loons.

Trumpeter Swans

The trumpeter swan population index was 1,029 in 2017, which was similar to the previous 11 year average from 2007 – 2016 (876). In 2015, the trumpeter swan population index was 1,601, which was inflated due to a single observation of a group of 50 swans (Figure 3). Trumpeter swans have consistently had the highest population indexes in the west strata (Figure 3).

Management Implications

Monitoring white-winged scoter and scaup populations is important for their management as a hunted and declining species. These species are not well represented in Continental surveys due to their late arrival on the breeding grounds and/or nesting. Yukon Flats has some of the highest nesting densities of white-winged scoters and scaup in the Boreal forest, making this survey a valuable early warning to further population declines, which could, in turn, help trigger Continental scale management actions. There is no other extensive aerial survey tailored to these late nesters in the Boreal forest. Expansion of these surveys throughout the Alaskan and Canadian Boreal forest would provide more information on population trends throughout their breeding range.

White-winged scoter and scaup surveys also provide information on species distribution within the Yukon Flats. Broad scale surveys provide information that is important for land-based management decisions such as proposed land trades, realty purchases of in-holdings, proposed access routes and roads, etc. Without spatially explicit information on species distribution and habitat, managers are unable to assess the value of potential development areas to trust species.

ACKNOWLEDGEMENTS

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Table 1. Indicated total number of birds counted, estimated density per stratum, and estimated total number of scoters, scaup and loons from an aerial monitoring survey conducted on the Yukon Flats, Alaska, 5, 6, 7, and 13 June 2017.

Species	Stratum	Sample Area km^2 (n)[b]	2017 Indicated Total	2017 Density (birds/km^2)	2017 Estimated Total
WWSC[a]	east	157.8 (16)	186	1.20	2,551
	north	268.1 (18)	146	1.39	2,759
	south	105.3 (10)	444	1.82	2,689
	west	119.2 (9)	94	0.60	1,423
	Total	650.4 (53)	870	0.96[c]	9,303[c]
SUSC[a]	east	157.8 (16)	2	0.01	27
	north	268.1 (18)	0	0.00	0
	south	105.3 (10)	4	0.18	0
	west	119.2 (9)	0	0.00	0
	Total	650.4 (53)	6	0.01[c]	82[c]
SCAU[a]	east	157.8 (16)	491	3.16	6,734
	north	268.1 (18)	363	3.45	6,860
	south	105.3 (10)	607	2.36	3,265
	west	119.2 (9)	859	5.44	13,005
	Total	650.4 (53)	2,320	2.48[c]	24,112[c]
COLO[a]	east	157.8 (16)	5	0.03	69
	north	268.1 (18)	5	0.05	94
	south	105.3 (10)	2	0.13	0
	west	119.2 (9)	0	0.00	0
	Total	650.4 (53)	12	0.02[c]	166[c]
PALO[a]	east	157.8 (16)	4	0.03	55
	north	268.1 (18)	17	0.16	321
	south	105.3 (10)	50	0.22	156
	west	119.2 (9)	28	0.18	424
	Total	650.4 (53)	99	0.11[c]	1,071[c]
TRSW[a]	east	157.8 (16)	4	0.03	55
	north	268.1 (18)	14	0.13	265
	south	105.3 (10)	20	0.19	84
	west	119.2 (9)	43	0.27	651
	Total	650.4 (53)	81	0.11[c]	1,029[c]

[a] WWSC = white-winged scoter, SUSC = surf scoter, SCAU = scaup, COLO = common loon, PALO = Pacific loon, TRSW = trumpeter swan, and no black scoters were observed during this survey.

[b] Total Stratum Area (km^2): west = 2,388.7, south = 3,217.3, north = 1,989.8, east = 2,132.4.

[c] Total estimate is from a model that is not strata specific.

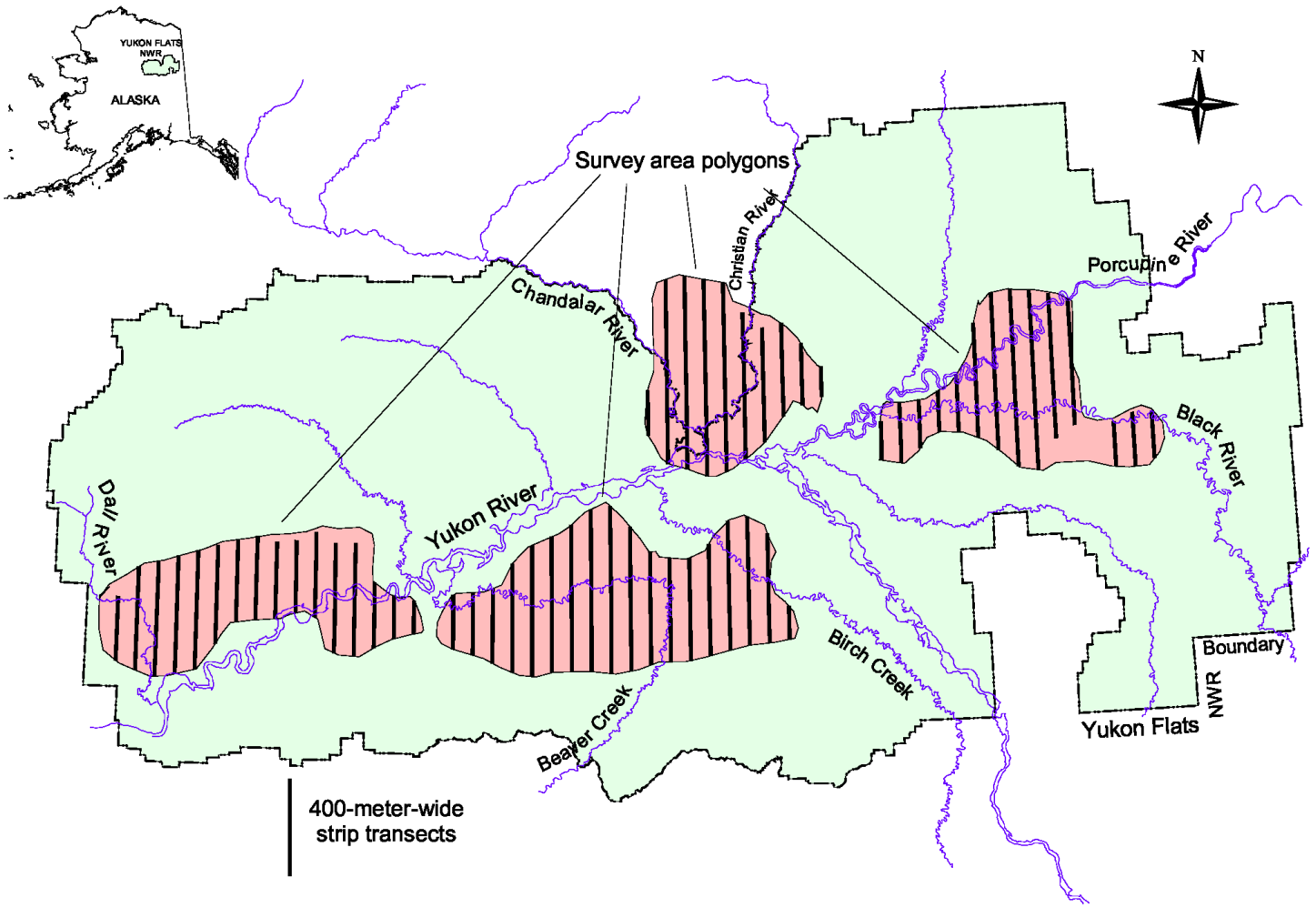
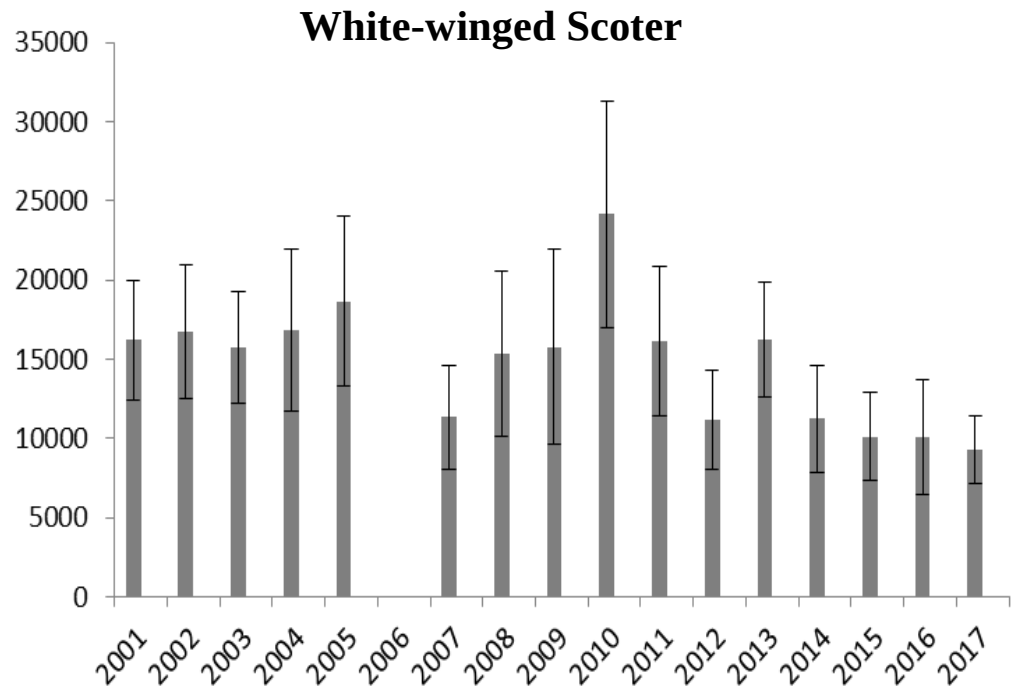
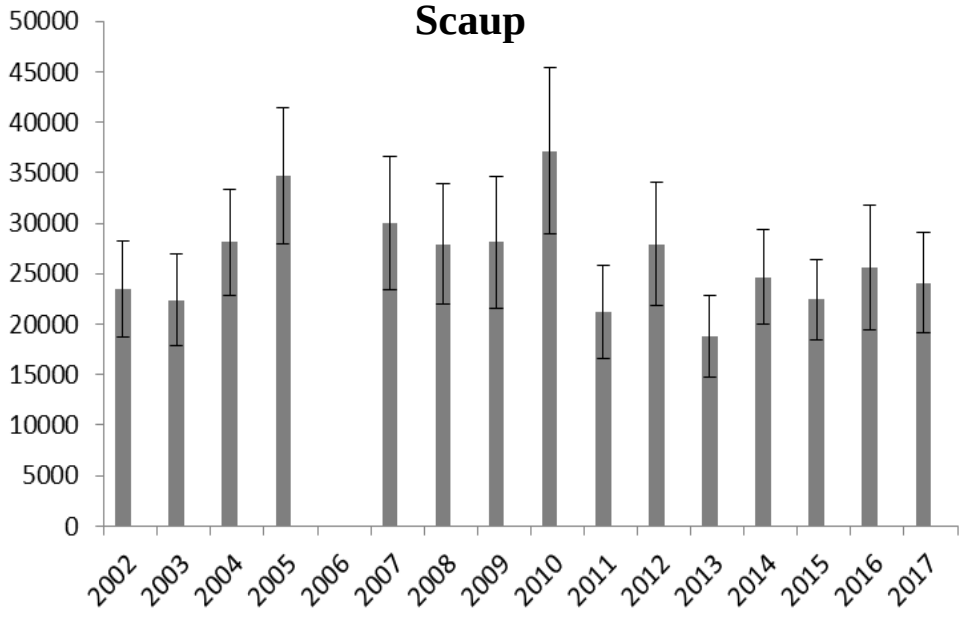


Figure 1. Map features of the Yukon Flats, Alaska in relation to the transect locations, 2001 – 2017.



a)



b)

Figure 2. Estimated total number of a) white-winged scoters and b) scaup for the Yukon Flats study area from 2001 and 2002, respectively, to 2017. Error bars are 95% confidence limits.

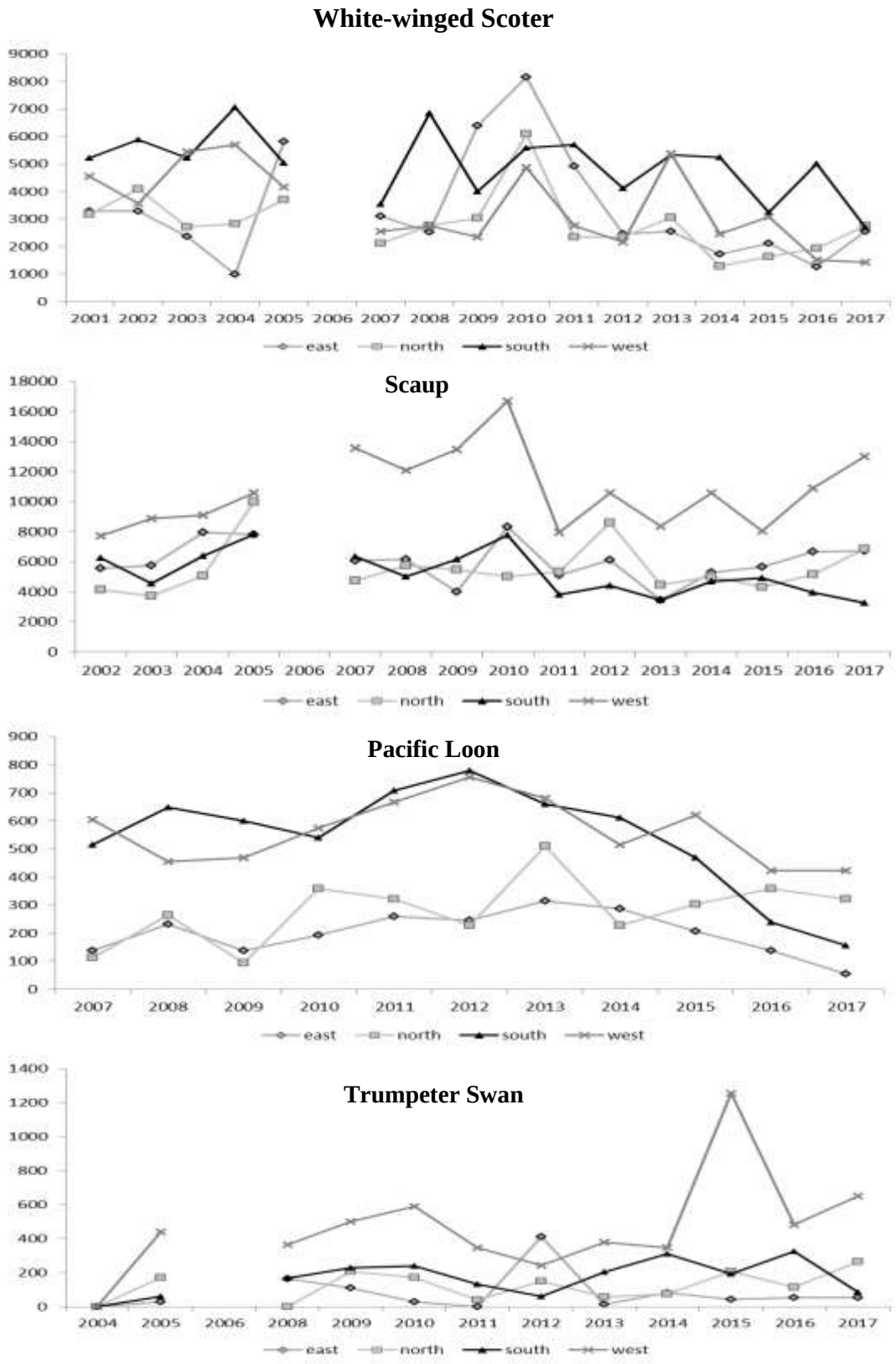


Figure 3. Estimated total number of white-winged scoters, scaup, Pacific loons, and trumpeter swans by strata from an aerial monitoring survey conducted on the Yukon Flats, Alaska, June 2001 - 2017. A survey was not conducted in 2006, scaup were not surveyed in 2001, loons were not surveyed in 2001 – 2006, and trumpeter swans were not surveyed in 2001 – 2004, 2006, and 2007.